

# **WATER RESOURCES INVESTIGATION**

## **RIPPOWAM RIVER BASIN CONN. & N.Y.**

### **PLAN OF STUDY**

**Flood Control**

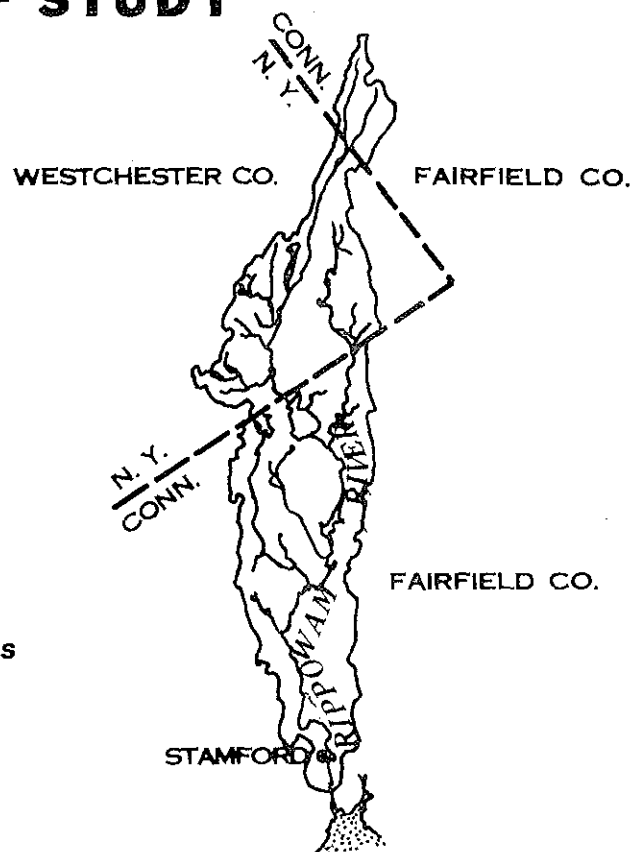
**Navigation Recreation**

**Water Supply**

**Water Quality Control**

**Fish & Wildlife**

**Water and Related Land Resources**



**DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
WALTHAM, MASS.**

**SEPTEMBER 1976**

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CONNECTICUT AND NEW YORK

FLOOD CONTROL AND WATER AND RELATED LAND RESOURCES

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FOR  
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PREFACE

The Plan of Study presents the general procedures to be followed in determining the need for and advisability of improvements in the Rippowam River Basin for flood control, recreation, water supply, water quality, navigation, fish and wildlife, and allied purposes and in developing and formulating the most economical and optimum plan to meet the needs of the area. Portions of this Plan of Study will, by reason of continued coordination, communications, and findings, be subject to change as required.

The plan specifies that, in seeking solutions to the water related needs of the study area, consideration will be given to the objectives of National Economic Development and Environmental Quality as well as Regional Development and Social Well-Being of the people. All significant adverse and beneficial project effects on the environment, including the esthetics of the area, will be identified and assessed, and the feasibility of eliminating or minimizing adverse effects will be fully explored.

The Rippowam River Basin study is a feasibility study of survey scope referenced by the Water Resources Council as Level C. It encompasses a narrower geographic or analytic scope than Levels A or B. The results of this study will be available for local use, as well as interagency use in determining the feasibility of providing flood protection and other water and land related resource needs in the community.

This study will incorporate and update information from previous studies of the Rippowam River Basin. Earlier reports currently available include investigations of dam and reservoir construction in the upper watershed and a local flood protection project consisting of channel excavation, concrete walls and earth dikes in the lower watershed. In addition, a floodplain delineation has been made within the City of Stamford, Connecticut in connection with flood insurance studies for that city. Other water resource needs will be determined at public meetings and through coordination with State agencies and local interests.

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PLAN OF STUDY  
WATER RESOURCES INVESTIGATION  
RIPPOWAM RIVER BASIN  
CONNECTICUT AND NEW YORK

A. AUTHORITY FOR STUDY

1. BACKGROUND - The study of the Rippowam River Basin has, as its objective, the determination of foreseeable short and long term water and related land resource needs, within the limits of the 37.5 square mile watershed. In addition, a management plan will be formulated to provide for the best use or combination of uses of the resources of the basin to meet these needs.

The primary concern of local interests is the control of future flooding to prevent damages to residential, industrial and commercial properties and to protect the well-being of the residents and property owners in the basin. Recent flooding at several scattered locations in the lower Rippowam River Basin and the lack of hydrologic data for this relatively small river basin prompted the decision to recommend a basin study rather than several individual studies of isolated sites. This would be the most prudent approach because the construction of a single local protection project at one site could easily increase discharges into downstream areas, thereby increasing the flood hazard at these locations.

During the course of the study, investigation of other water resource needs, including recreation, water supply, water quality, navigation and fish and wildlife will be accomplished. The scope of investigation of these allied resources will be dependent on the need and desires of local interests as well as other Federal and State agencies.

2. RESOLUTION - Acting in response to the desires and needs of local interests, the Honorable Stewart B. McKinney, Representative of the Fourth Congressional District of Connecticut, sponsored a Resolution, adopted 10 October 1974 by the Committee on Public Works of the United States House of Representatives. The Resolution reads as follows:

"Resolved by the Committee on Public Works of the House of Representatives, United States, that the Board of Engineers for Rivers and Harbors is hereby requested to review the report on Land and Water Resources of the New England-New York Region, transmitted to the President of the United States by the Secretary of the Army on 27 April 1956, and subsequently published as Senate Document Number 14, Eighty-fifth Congress, with a view to determining in the light of the heavy damages suffered during the storm of June 1972, in Northeastern United States,

the advisability of improvements, particularly in the Rippowam River Basin in the vicinity of Stamford, Connecticut, in the interest of flood control, navigation, water supply, water quality control, recreation, low flow augmentation, and other allied water uses in this heavily urbanized area."

#### B. PURPOSE OF THE PLAN OF STUDY

3. PURPOSE - The purpose of this Plan of Study is to establish the procedure for the study of long term flood control, water supply needs, improvement of water quality, development of recreational potential enhancement of fish and wildlife, and other water related resources. It is to be used as a management tool to assist motivation, direction, and coordination of the investigation. The Plan of Study will:

a. Provide the planner with an advance planning tool for developing a plan of action prior to the start of the study.

b. Define at the earliest practicable date the anticipated problems associated with the analysis, formulation, policies, objectives, needs and scale of studies required during the course of the investigation.

c. Insure early and continuing coordination with, and services from, other Federal, State, and local agencies; and generate response from responsible and informed local groups. Early coordination is essential to avoid delay of investigations and to accomplish a plan of improvement that is both responsive to the needs of, and acceptable to the State and communities involved,

d. Provide the Chief of Engineers with advance information on the nature of the investigation.

The study has, as its objective, (1) the determination of foreseeable short and long term water and related land resource needs in the basin, (2) the formulation of a management plan to provide for the best use of combination of uses of the basin to meet those needs, and (3) the recommendation of specific projects or programs to alleviate water resource problems in the basin. As the study progresses close coordination will be maintained with the local communities as well as necessary Federal and State agencies and civic groups.



### C. PHYSICAL CONDITIONS

4. THE WATERSHED AND STUDY AREA - The Rippowam River Basin is located in southwestern Connecticut and southeastern New York and has a total drainage area of 37.5 square miles, taken at the Pulaski Street Dam. This coastal stream empties into the West Branch of Stamford Harbor at Stamford, Connecticut. The Basin is 17 miles long and has a maximum width of 4 miles. The main river has a total drop of about 670 feet in its 21 miles of length. The topography of the basin is generally hilly, with elevations varying from 850 feet in the headwaters to sea level at Stamford Harbor. The lower reach of the watershed is heavily urbanized in the city of Stamford, while the upper watershed is more rural in nature. The steep slopes of the tributary streams are conducive to rapid runoff.

The Rippowam River originates in the town of Lewisboro, New York and flows in a generally southern direction for a distance of 6.2 miles to its confluence with the Mill River. Below this junction the Rippowam River continues its southerly course to Stamford Harbor. The Mill River, principal tributary of the Rippowam River originates in Ridgefield, Connecticut and drains about 13.3 square miles. Flowing in a southerly direction, the Mill River has a total length of about 6.5 miles within the towns of Pound Ridge and Lewisboro, New York. Other significant tributaries of the Rippowam River are Haviland, Poorhouse and Toilsome Brooks which drain 3.7, 3.0 and 1.6 square miles, respectively. Five water supply reservoirs located in the basin are as follows:

<u>Reservoir</u>	<u>River</u>	<u>Drainage</u>	<u>Storage</u> (Million Gallons)
		<u>Area</u> (Square Miles)	
Trinity	Mill	0.7	450
Laurel	Mill	13.2	2,250
Siscowit	Rippowam	3.5	88
No. Stamford	Rippowam	21.4	512
Mill	Mill	4.25	1,212

5. CLIMATOLOGY - The Rippowam River has a variable climate, characterized by frequent but usually short periods of precipitation. The climate of the basin is influenced by its proximity to Long Island Sound, which moderates extreme temperatures in both summer and winter. The basin lies in the path of the "prevailing westerlies" and the cyclonic disturbances that cross the country from west or southwest. It is also exposed to occasional coastal storms, some of tropical origin, that travel up the Atlantic Seaboard. In the late summer and the autumn months, these storms occasionally attain hurricane intensity. Usually accompanied by heavy precipitation, these storms pose a serious flood threat to the basin.

6. TEMPERATURES - Average monthly temperatures in the Rippowam River Basin vary widely throughout the year. The U.S. Weather Bureau Station at Stamford has records since 1950. The U.S. Weather Bureau Station at Norwalk, located eight miles east of Stamford, has an 83 year record of temperatures, which is representative of temperatures in Stamford. The mean annual temperature is about 50° F, with monthly averages varying from 28° F in the winter to 72° in the summer. Extreme temperatures of -22° and 104° F have been recorded. Mean monthly temperatures for the period of record are given in Table 1.

TABLE 1

Monthly Temperatures  
Norwalk, Connecticut  
 (1892 - 1975)  
 (Degrees Fahrenheit)

<u>Month</u>	<u>Mean</u>	<u>Maximum</u>	<u>Minimum</u>
January	27.7	70	-22
February	28.1	70	-20
March	36.7	87	-6
April	47.5	92	9
May	58.2	97	24
June	67.3	100	34
July	72.3	103	42
August	70.4	104	34
September	63.6	102	28
October	52.9	90	16
November	41.9	83	-4
December	30.5	71	-16
Annual	49.8	104	-22

7. PRECIPITATION - The mean annual precipitation (for 83 years of record) at the U.S. Weather Bureau Station at Norwalk is 45.90 inches and is fairly uniformly distributed throughout the year. The maximum and minimum annual precipitations recorded are 63.02 inches in 1972, and 33.52 inches in 1970, respectively. Maximum monthly precipitation of 17.23 inches occurred in October 1955. Minimum monthly precipitation of only 0.07 inches occurred in May 1903. Table 2 summarizes the precipitation record at Norwalk.

TABLE 2

Monthly Precipitation  
Norwalk, Connecticut  
(1892 - 1975)  
(Inches)

<u>Month</u>	<u>Mean</u>	<u>Maximum</u>	<u>Minimum</u>
January	3.38	7.35	0.45
February	3.39	7.46	0.49
March	4.11	12.42	0.23
April	3.80	8.60	0.77
May	3.94	10.78	0.07
June	3.45	16.21	0.14
July	4.07	11.81	0.65
August	4.46	15.80	0.27
September	3.97	15.64	0.23
October	3.57	17.23	0.16
November	3.86	8.86	0.76
December	3.90	9.33	0.85
Annual	45.90	63.02	33.52

8. FLOOD HISTORY - The rapidly moving cyclonic storms, or "lows" that travel over or near the Rippowam River Basin from the west or southwest produce frequent periods of unsettled, but not extremely severe, weather. The region is also exposed to occasional coastal storms, some of tropical origin, that travel up the Atlantic Coast and move inland over New England. The hurricanes and storms of September 1938, September 1944, August 1955 and October 1955, were of this type. The precipitation which accompanied the October 1955 storm averaged more than 13 inches over the watershed, falling on ground moderately saturated by seasonal rains. Almost eight inches of the total fell in a period of 12 hours. More recent flooding has occurred during June 1972 (Hurricane Agnes) September 1975, October 1975, and January 1976. The frequency of flooding clearly indicates the need for remedial action.

D. ENVIRONMENTAL AND SOCIO-ECONOMIC CONDITIONS

9. ENVIRONMENTAL SETTING - The Rippowam River watershed occupies portions of Westchester County, New York and Fairfield County, Connecticut. The watershed covers an area of nearly forty square miles and is located primarily in the city of Stamford, Connecticut. Stamford, population 110,000, is thirty five miles east of New York City and twenty miles southwest of Bridgeport, Connecticut.

The Merritt Parkway, a major highway in southern Connecticut, divides the watershed into two distinct areas. South of the Parkway, the land is highly urbanized while to the north it is mainly residential. The southern part of the watershed is zoned principally for commercial and residential use. Many public and private institutions such as schools and hospitals are found in the area. Residential neighborhoods are densely settled with lot sizes being on the average of a quarter acre. Numerous apartment complexes and highrise apartments are situated in this vicinity of Stamford. Industrial development is also an integral part of the community. Firms such as Combustion Engineering, Olin Corporation, and General Electric Credit Corporation are located along Long Ridge Road. Planned for the near future in this area is the development of new offices for Xerox Corporation. American Thread, Continental Oil, and Xerox Corporation are businesses which are located in the High Ridge Industrial Park.

Since the southern portion of the watershed is almost entirely developed, little of the natural environment remains. Native vegetation south of the Parkway is limited and in some places where it does exist, plans are being made for development of the area. However, in Scalzi Park, which is located just outside downtown Stamford, the natural setting remains relatively untouched. The Mill River Park, located in downtown Stamford, abuts the Rippowam River, providing much needed open space for the city. Each May the park becomes alive with the sight of blossoming Japanese cherry trees, donated to the city of Stamford by the Japanese Government.

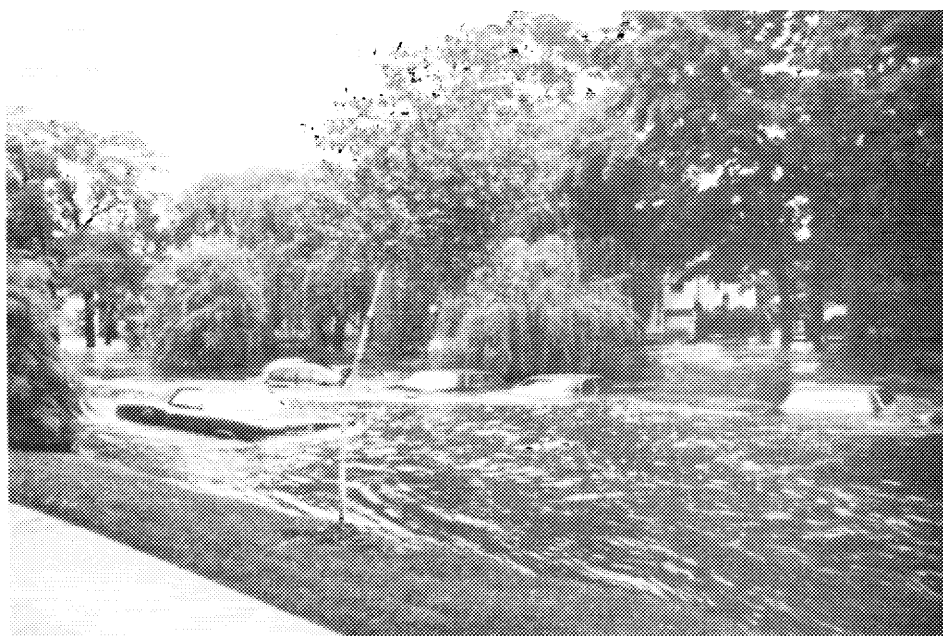
Norwalk Community College and other interested people are conducting archaeological digs along the Rippowam River about one mile south of the Parkway. Artifacts have been uncovered, which may indicate that the Rippowam Indians at one time camped here.

Flooding is a problem in the southern section of the watershed. Apartments and homes that have been built too close to the Rippowam River are experiencing flooded backyards and parking lots. Several old ornate, stone-faced bridges, worthy of preservation, collect debris floating in the river and act as dams, thus increasing the flooding in certain parts of Stamford.

The differences between the northern and southern regions of the watershed are striking. Once one crosses the Merritt Parkway development decreases rapidly. The terrain is hilly with extremely steep slopes in places. The vegetation is characteristic of the oak-hickory forest association. Interspersed with these hardwoods are native hemlock, pine, tupiptree and dogwood. The Bartlett Arboretum of the University of Connecticut, situated along Poorhouse Brook, is located just off Route 137 in the upper watershed. It fosters an extensive collection of native and exotic plant materials which are available for public enjoyment. Three reservoirs are located in the upper watershed, two of which,



SEVERENCE DRIVE



CANDLELIGHT APARTMENTS  
PARKING AREA

FLOOD OF JUNE 1972

Laurel and North Stamford, are owned and operated by the Stamford Water Company. These reservoirs are the source of drinking water for the city of Stamford. There are also many streams, ponds, and lakes which add to the scenic quality of the river basin. Remnants of glacial action is still in evidence today in the region. Many rock outcroppings and scattered boulders can be found. One of the notable boulders, Rimmon Rock, is approximately 40 feet high and could weigh as much as 2,000 tons. It is considered to be the largest boulder of its kind in southern New England.

Most of the land is sparsely developed in comparison with the city of Stamford. Stately homes are abundant, especially when one enters Westchester County, New York. Many developed properties are two to four acres in size, with some being as many as ten. The scenic quality of these properties are high, with the grounds being carefully maintained.

#### 10. ECONOMIC AND SOCIAL BASE

a. Land Use - In the 20 year period between 1954 and 1974, an average of 300 acres a year were developed in the city of Stamford.\* Of this figure, about 115 acres were devoted to single family home developments. This predominance of single family home construction has since ended as annual construction in this category has been reduced to an average of 33 acres annually. In more recent years, multifamily development has increased, while in the period studied, the land area percentage utilized as multifamily had only risen from 2.7% to 3.2%. The Planning Board attributes this disparity to the demolition of some multifamily structures; these demolitions were due to urban renewal, the building of the Connecticut Turnpike, and the construction of new office and retail facilities in the central city.

Between 1954 and 1974 the commercial use of land doubled as the creation of a number of shopping centers led growth in this area. Although downtown Stamford lost some commercial properties due to urban renewal, the city today is the scene of new construction, and it remains the major retail center of the region. Utilization of land for manufacturing showed only a minimal increase in the period. However, the establishment of a number of corporate headquarters in the city produced major increases in land use for this category.

Stamford has 5,000 acres denoted "wetlands," 1,000 of which have been developed in the last 25 years. The locating of corporate headquarters in Stamford has been the major reason for the filling in of these wetlands. Total developed land increased 50.5% between 1954 and

\*Land use information discussed in this profile is taken from a study of land use characteristics for the period 1954-1974 conducted by the city of Stamford Planning Board.

1974 (from 11,649 to 17,534 acres). Development other than wetlands appears to have peaked inasmuch as northern Stamford is mostly undevelopable. The use of the remaining wetlands is subject to controversy because of the increasing likelihood of severe flooding.

b. Population - Population in the Rippowam River Basin is concentrated in the city of Stamford, an older northeastern goods producing center that is gradually converting to a services-producing orientation. The city's population has grown slowly in recent years. There was a 17.3% increase in the period 1960-1970 as compared with a 24.8% increase during the previous decade. The county population grew by 21.3% during the sixties.

The Stamford SMSA, which includes a portion of Fairfield County, grew 15.7% between 1960 and 1970. The Bridgeport SMSA has a comparable rate of change (15.1%). On the other hand, the Norwalk SMSA grew at 24.1% and the nearby Danbury SMSA's 44.3% in the same period. The factors inhibiting population growth in the city of Stamford include a decline in manufacturing, the condition of housing stock and availability of housing, peaked land development, and the more rapid growth of surrounding communities.

New Canaan is a residential community in the basin with a 29.6% population growth rate between 1960-1970. Ridgefield in the northwest portion of Fairfield County grew at a phenomenal 122.8% in the period 1960-1970. Ridgefield surpassed New Canaan in population in that period. Between 1970 and 1975 Ridgefield's growth slowed. Other small towns in Fairfield County have absorbed the new population movements. The following tables show population changes, density and employment figures.

c. Transportation - The cities and towns of the Rippowam River Basin are served by two major east and west (within the Basin) highways: The Merritt Parkway and the Connecticut Turnpike (I-95). They are complemented by Route 7, running north and south, which connects the east and west routes with Interstate 84 to the north and provides access to the Danbury, Connecticut region.

Rail commuter service is provided by Amtrak to New York City, to Washington, D.C., and to Boston, Mass. Recent capital expenditures by Amtrak have made a significant improvement in service, and ridership has increased after years of decline. Rail freight service, on the other hand, has been declining. The formation of Conrail may reverse this trend. In past years, three major rail freight systems were available. These were reduced to one. As a consequence an increase in trucking has developed.

TABLE 3

POPULATION & DENSITYPOPULATION

	1970	1960	% Change 1960-70	1950	% Change 1950-60
Stamford, CT	108,798	92,713	17.3	74,293	24.8
New Canaan, CT	17,455	13,466	29.6	8,001	68.3
Ridgefield, CT	18,188	8,165	122.8	4,356	87.4
Fairfield County	792,814	653,589	21.3	504,342	29.6
Pound Ridge, NY	3,792	2,573	47.4	1,234	108.5
Lewisboro, NY	6,610	4,165	58.7	2,352	77.1
Westchester County	894,104	808,891	10.5	625,816	29.3
Stamford SMSA	206,419	178,409	15.7	134,896	32.3
Stamford City	108,798	92,713	17.3	74,293	24.8
Outside Central City	97,621	85,696	13.9	60,603	41.4
Outside Darien	20,411	18,437	10.7	11,767	56.7
Outside Greenwich	59,755	53,793	11.1	40,835	31.7
Outside New Canaan	17,455	13,466	29.6	8,001	68.3

Sources: 1960 and 1970 U.S. Census, Connecticut, Number of Inhabitants

POPULATION DENSITY

Community	Land Area (sq. miles)	Persons Per Square Mile			
		1975*	1970	1960	1950
Stamford	37.3	2903	2911	2486	1992
New Canaan	23.0	843	759	585	348
Ridgefield	34.7	568	524	235	126

Sources: \*Conn. Dept. of Health - Conn. Dept. of Commerce

1960-1970 U.S. Census



TABLE 4  
INCOME AND EMPLOYMENT

INCOME

	<u>1970 Per Capita</u>	<u>1970 Median Family</u>
The State (Connecticut	\$ 3,900	\$ 11,884
Stamford SMSA	6,360	15,862
New Canaan	8,442	23,889
Ridgefield	4,853	16,833
City of Stamford	4,787	13,571
Urban Balance	6,861	17,818
Fairfield County	4,676	8,058

PLACE OF WORK

	<u>No. of Workers</u>	<u>Worked in County of Residence</u>	<u>%</u>	<u>Worked Outside</u>	<u>Not Reported</u>
Stamford SMSA	85,881	60,728	70.7	18,300	6,853
City	47,828	37,286	78.0	5,928	4,614
New Canaan	6,286	3,567	56.7	2,306	413
Urban Balance	31,179	20,331	65.2	9,043	1,805
Ridgefield	6,153	4,287	69.7	1,436	430
Connecticut	1,244,399	969,662	77.9	172,039	102,698
Fairfield County	323,958	252,599	78.0	43,952	27,407

TABLE 4 (Cont'd)

EMPLOYMENT AND UNEMPLOYMENT

<u>Employment</u>	<u>Monthly Averages %</u>		
<u>Stamford</u>	<u>1975</u>	<u>1974</u>	<u>Feb. 1976</u>
Total Non-Agriculture	87.0	87.7	90.4
Total MFG	27.0	28.7	28.4

Seasonally Adj. Unemployment Rate

	<u>Monthly</u>		
	<u>1975</u>	<u>1974</u>	<u>Feb. 1976</u>
U.S.	8.5	5.6	7.6
N.E.	10.5	6.6	9.7
Connecticut	9.2	6.1	9.8
Stamford (city)	7.3	5.2	6.9

Source: New England Economic Indicators, April 1976 (Federal Reserve Bank of Boston)

Bus commuter service has declined as it has nationally. Stamford does have an operating commuter bus system which is vital because there is a growing traffic volume of private autos and commercial vehicles both within the heavily urbanized city and on the limited access highways in the area. Other contributing factors to congestion include street and ramp characteristics and traffic flow patterns.

New York's LaGuardia and Kennedy airports are a convenient distance from the city of Stamford. The nearby commercial facilities are Westchester County Airport, located 12 miles from Stamford, and Bridgeport Municipal Airport.

d. Economic Activity and Structure - The city of Stamford comprises 50% of the population and provides 60% of the jobs in the Stamford SMSA. It is the retail center of the SMSA and site of a number of corporate headquarters. Stamford is forecasted as becoming an economic beneficiary of the decentralization of the New York urban region.

An older northeastern city, Stamford remains substantially dependent on goods-producing industries and possesses older multistory manufacturing structures. In recent years, however, a number of manufacturing firms have moved to other sites in Fairfield County. The most favorable site location factor consists of land availability for sprawling single story facilities. These other locations are in relatively less developed areas in the county such as Greenwich, Westport and Fairfield. Aside from these internal migrations, the county as a whole has not, relative to certain other Connecticut counties, exhibited strong growth characteristics in recent years.

Several of the corporations listed in the "Fortune 500" have their headquarters located in Stamford. In the time span 1964-1974 2,073,000 sq. ft. of office floor space have been added in the city. Three hundred acres of rezoning and the addition of 8,300 administrative and clerical personnel resulted.\*

Moreover, there is ongoing a \$275 million dollar urban renewal project encompassing 130 acres of Stamford's downtown area. This project consists of 550 units of moderate income housing, 225,000 sq. ft. of retail space (Macy's Department Store), additional smaller retail space and a 21 story office tower with retail and service facilities. At the Stamford Forum GT&E offices, a Marriott hotel, parking areas, retail and office space are designed.\*\* In addition, Stamford has acquired a reputation as the home of many research facilities. The latter constitute 20% of Stamford's service sector.

\*Stamford Planning Board News Release June 19, 1975

\*\*Stamford Area Commerce & Industry Association

The major occupational categories in the 1970-1974 period were those of professional and technical workers (20.4% of total), clerical workers (20.2%) and managers, officials, and proprietors (15.7%). The number of unemployed in Stamford has been consistently lower than that of New England and the U.S. in the last two years.

Job openings in the same period were concentrated in three areas: trade, especially wholesale; the service industries; and the finance, insurance, and real estate field. The research and development area also experienced employment expansion. In summary, Stamford and Fairfield county are relatively slow growing today and not the only inheritors of New York's corporate and industrial "exodus."

e. Income - According to the 1970 census, the per capita income of the Stamford SMSA is \$6,360, which is significantly higher than Connecticut's \$3,900. Generally, the Stamford area is a more affluent area than the state. The city of Stamford has a per capita income of \$4,787 which is higher than the State but lower than the SMSA, although it is comparable to Fairfield county's \$4,676,

Ridgefield's per capita income of \$4,853 is in the same range as the city of Stamford and Fairfield County. By contrast, New Canaan is a wealthy residential town with a per capita of \$8,442.

With median family income as an indicator, New Canaan (\$23,889) leads Ridgefield (\$16,833), the Stamford SMSA (\$15,862), Stamford (\$13,571) and the State (\$11,884). Again, New Canaan's income figure is significantly higher. In general, the Stamford area is relatively affluent with a high effective purchasing power. The higher incomes show the effect of the presence of corporate executives and staffers, both those locally employed and those working in New York City. There are indications that many of these corporate workers commute 30 miles or more to work. They are residing in communities neighboring Stamford, including New Canaan.

f. Housing - In Stamford, multifamily housing construction is now the dominant type constituting 80% of all new units. Recent years have witnessed a steady decline in one family housing construction. Less than 50% of all housing units are one family, although this percentage is still substantial relative to other Connecticut cities.

Housing stock is in a variety of conditions. Rehabilitation is proceeding and remains necessary in the central city. About 25% of all multifamily units require additional maintenance or rehabilitation. The average number of residential units being built is decreasing. There is vacant land zoned residential, but the small amount of such

lands that are developable warrants a careful decision on use. The city is deciding between one family and multifamily housing for the remaining land. Stamford has higher vacancy rates in its larger residential units. There is also an over supply of condominiums. Public (subsidized) housing and housing for senior citizens is currently inadequate. There is a large waiting period to obtain apartments in all categories (i.e. low income, sr. citizen). There is a need for more housing to meet the city's future population. Some youth and senior citizens may decide to leave the city due to insufficient housing availability.

In the last 10 years demolitions have averaged 195 units annually; 50% of these were due to urban renewal. Housing types are mixed in Stamford, while northern Stamford, New Canaan, and Ridgefield are generally semirural one family home areas.

#### E. IMPROVEMENTS DESIRED BY LOCAL INTERESTS

11. PUBLIC MEETING - A Public Meeting was held on 24 May 1976 at Stamford, Connecticut to determine the interest of local officials and citizens in the study and the water resource needs of the communities in the Rippowam River Basin. An exchange of information was held concerning flooding problems in the basin as well as other land and water resource related problems and their possible solutions.

About 150 people attended the meeting and 27 individuals representing Federal, State, City, Civic, Commercial and Private Interests spoke or participated in the discussion. It was clearly indicated at the meeting that the control of flooding, particularly in the highly urbanized areas of Stamford, was the primary need of the people, and that this water resource need should be emphasized during the study. Only one speaker felt that funds should be used for other community needs such as schools. Most residents feel that the flood problem has worsened in recent years due to developments in the upper watershed and channel encroachment in lower reaches of the basin,

One speaker stated that flood control could be better effected by more efficient control of discharges from four water supply reservoirs located in the upper watershed. Several speakers discussed specific flood problem areas on tributary streams and reiterated that developers were still receiving permits to fill wetlands. Other residents suggested a program of land acquisition along the main river in the commercial center of Stamford to permit public access to a so-called "greenbelt" area.

Several separate civic associations such as the Riverbend Association, Toilsome Brook Association, Castlewood Park Association and the Rippowam Protection Committee emphasized particular floodprone areas, located within their jurisdiction. Major problem areas on the main stream appear to be at Cold Spring Road, Severence Drive, Forest Lawn Avenue, Bridge Street, West Broad Street, River Street and Main Street. Erosion conditions are also taking place at several sharp bends which add to the restriction of channel flows at these locations. Spokespersons for these Committees asked if existing dams along the river could be reconstructed for flood control purposes. They were informed that this would be included in the study.

One resident was interested in determining if recreational improvements could be made in the North Stamford Area. He was concerned that Lake Andrea was no longer suitable for swimming. Another resident discussed the fact that the once scenic stream has turned into an open sewer and that part of the problem can be traced to the many storm drains that enter the Rippowam River. Another resident felt that dredging the river would be an adequate solution to the flood problem.

A representative of the local conservation group stated that a scientific study by qualified environmental scientists should be conducted, management must be primarily ecological in nature and should recommend that encroachment within the floodways be prohibited, he concluded.

Attachment I to this report presents a more detailed summary of major points that were discussed at the Public Meeting,

#### F. OBJECTIVES OF INVESTIGATION

12. GENERAL - The main purpose of the study of the Rippowam River Basin is to determine, and report to the Congress of the United States, the advisability and economic justification for Federal assistance of providing improvements for flood control and allied purposes on the Rippowam River and its tributary streams. In accomplishing this goal, consideration will be given to finding solutions to immediate and long range flood control and other water related needs and problems of the study area. Equal consideration will be given to each of the following objectives:

a. National Economic Development - Maintaining or increasing the value of the nations output of goods and services as well as improving natural economic efficiency may be achieved through the development

of water and related land resources. In accordance with this objective, the present and projected needs will be assessed for flood control, recreation, water quality, fish and wildlife, navigation, water supply, and other elements of water resource development. The annual costs of the measures for these various purposes will be compared against the annual benefits in the interest of selecting projects based on national economic objectives.

b. Regional Development - The regions income gains and the additional economic impact will be evaluated on the basis of possible expansion of business, industry, and recreation and on population and social development that could result from a comprehensive plan of improvement.

c. Environmental Quality - The preservation and enhancement of the Nation's environmental resources is essential to insure their availability for future use. The investigation will consider the preservation of natural and cultural areas, creation or restoration of scenic areas, preservation and enhancement of recreational areas, and the rehabilitation and protection of esthetic values in the study area. In accordance with the National Environmental Policy Act of 1969, all available means will be utilized to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic and other requirements of present and future generations.

d. Social Well-Being - The social well-being of the greatest number of people shall be the overriding determinant in considering the best use of water and related land resources. Consideration shall be given to project effects on real income, security of life, health and safety, education, cultural and recreational opportunities, emergency preparedness, and other factors. Hardship and basic needs of particular groups within the general public shall be of concern, but care shall be taken to avoid resource use and development for the benefit of a few to the disadvantage of many.

13. EFFECTS ASSESSMENT - The assessment will cover all environmental, social, and economic effects, following the guidelines established by ER 1105-2-105, to insure that all significant adverse and beneficial project effects are systematically identified and assessed, and the feasibility and cost of eliminating or minimizing adverse effects is taken fully into account. Possibilities of project benefit and adverse project effects on the environment, recreation, and esthetics of the area have been made apparent by the present stage of the study.

Project encouragement of development trends will be carefully assessed to assure preservation of environmental resources. On the other hand, controlled development and wise usage of areas rendered free of flood threat may produce social benefits justifying work improvement. The resulting decisions and project recommendations

will be made in the best overall interests of the public with a balance maintained between elements of dollar benefits and costs, the degree of satisfaction of public needs, and the extent of other types of effects. To accomplish this, the tentative profile of existing conditions obtained from prior studies will be augmented to show projections of conditions with and without the project or alternatives over the life of the projects. Significant effects will be identified and evaluated. Any desirable project modification revealed by the assessment will be considered. Survey studies will draw on all known sources of information for effects assessment.

#### G. PRIOR INVESTIGATIONS AND REPORTS

14. FEDERAL AND NONFEDERAL - During 1956, a private consulting architect engineer firm conducted an investigation of dam sites in the Rippowam River Basin for the New England Division, Corps of Engineers. This preliminary study included field inspections, selection of six possible sites and preparation of cost estimates. The sites, located in the lower watershed, were not economically justified due to the high cost for lands and damages, while the three upper sites did not control sufficient watershed areas to be effective. These findings will be investigated and updated during this Rippowam River Basin study.

During 1963, another private engineering firm conducted flood control improvement studies of the Rippowam River for the State of Connecticut Water Resources Commission. Hydrologic and hydraulic studies were conducted for the 2.8 mile lower river reach and a feasible plan of flood protection was developed. Plans, profiles and cost estimates were developed for this study and will be reviewed and updated during the current investigation.

The Corps of Engineers, N.E. Division, was engaged by the Dept of Housing and Urban Development (HUD) in 1973 to perform a Flood Insurance Study for the city of Stamford, Connecticut. The purpose of the study was to define the stage and extent of the "100-year flood" for coastal areas and river floodplains. In addition to the entire coastal reach of Stamford, detailed analyses were performed on the Mianus, Noroton and Rippowam Rivers. These evaluations consisted of a determination of the discharge, and consequent water surface elevation, and an accompanying map delineating the resultant floodplains. The initial draft report and maps for this study were presented to the city in a meeting in Stamford on 10 January 1975. Based on comments from city officials at this meeting, the Corps undertook further analysis of the Rippowam River. The draft report was revised accordingly, and was resubmitted to HUD in May 1976.

No other Federal or Nonfederal Reports on the Rippowam River Basin are known at this time.



## H. SCOPE OF STUDY

15. WATER RESOURCE NEEDS AND OBJECTIVES - The Rippowam River Basin Study's objective is to investigate the water resource needs of the States of Connecticut and New York and the individual communities within the basin limits. These needs include flood control, water supply, recreation water quality, fish and wildlife protection and to a lesser extent, navigation. The study will determine where specific problems exist and if alleviation of such problems would benefit the residents residing therein. The approach to determining these problems will be accomplished through phase studies of each of the resource needs. Stage 1 studies through public and private meetings have identified water resource problems in the basin and suggest potential alternatives to correct these problems. Stage 2 studies will more fully detail and evaluate significant problems and alternatives outlined in Stage 1, through reiterative investigations. Stage 3 will completely detail the recommended plans which satisfy the multiobjective planning framework of the Principles and Standards process. These studies will determine if the Federal Government can contribute assistance toward solving the problems by project construction or implementation of other programs.

16. TYPES OF IMPROVEMENTS REQUIRED - There are many improvements which would assist residential, commercial and industrial property owners in the Rippowam River Basin. The following are descriptions of areas of improvement which will be investigated by the current study.

a. Flood control is a particularly serious problem within the highly urbanized lower watershed areas. The frequency of flooding events has increased markedly during recent years due to increasing demands for development of vacant lands in the mid-basin area. The upper basin is almost wholly undeveloped because much of this acreage is owned by the Stamford Water Company. All flooding problems on the Rippowam River or its tributaries will be identified and nonstructural and/or structural techniques for alleviating these conditions will be investigated through an iterative process. It is apparent that any plan for flood control improvements in the basin would enhance capabilities for attracting new business and industrial development, which is sorely needed in the New England area.

b. Water supply for about 82,000 people in Stamford and 20,000 in Darien, Connecticut, is provided by the Stamford Water Company from five water supply reservoirs located in the upper watershed. These five reservoirs store about 5,000 million gallons which is sufficient to meet the current needs of the community. However, based on population projections of growth, the existing system will not meet future water supply requirements and additional storage will have to be provided. If it is feasible to include future water supply in any economically justified plan of flood control improvements such as dam and reservoir construction, river diversions or pumped storage, this will be investigated further.

c. Recreation - There is considerable potential for recreational development in the Rippowam River watershed. At the present time the city of Stamford is updating their master plan. They have investigated a plan for land acquisition along a mile reach of the river in the commercial center of Stamford which, if implemented, would provide a "green belt" and water based recreation opportunities. In addition, plans for improvements of water quality will be investigated to determine future potential for a full range of recreational pursuits, including boating, swimming, picnicking, fishing, hiking, etc.

17. PROCEDURES FOR SELECTION OF IMPROVEMENTS - Studies will be directed to formulating and analyzing alternatives for consideration and comparison during the planning process. Effectiveness of methods designed to meet selected needs and problems and economic feasibility will be judged by the benefit-cost ratio and the principle of maximization in plan formulation of benefits and multiple objectives including national economic development, regional development, environmental quality, and social well-being.

Project effects that cannot be incorporated in the benefit-cost evaluation will be assessed separately in accordance with guidelines of ER 1105-2-105, subject: "Guidelines for Assessment of Economic, Social and Environmental Effects of Civil Works Projects." This regulation furnishes guidelines, published 28 September 1972, for the assessment of economic, social and environmental effects of civil works projects. They are designed to insure that all significant adverse and beneficial effects of Corps of Engineers projects are fully considered in pre and post-authorization planning. The guidelines have been approved by the Secretary of the Army and comply with the directive of Congress contained in Section 122 of the River and Harbor and Flood Control Act of 1970, Public Law 91-611. These guidelines supplement and extend the requirements of the National Environmental Policy Act of 1969, (Public Law 91-190).

18. STUDY GUIDELINES - Studies will include survey report details as required by EM 1120-2-101, subject: "Survey Investigations and Reports, General Procedures." This manual incorporates the basic instructions for the planning, conduct and processing of survey reports through authorization of projects by Congress. The EM 1120-2-100 series of manuals provides basic information and guidance on the origin, conduct, and principles and procedures of engineering and economic investigations for civil works projects. The task of investigation requires careful coordination and cooperation among all Federal and Nonfederal interests concerned, basic research of hydrologic and hydraulic conditions, gathering and analysis of economic data, deriving and comparing the relative merits of all practicable solutions for related and conflicting demands for water uses and site development, assuring optimum use of resources and sites and securing the maximum net benefits, determining the most equitable sharing of costs under the law among Federal and local interests, and presenting a satisfactory and adequate report on the matter for the information of all concerned and for a basis of action by Congress.

Studies will be conducted in accordance with ER 1105-2-200, "Planning Process: Multiobjective Planning Framework." This regulation establishes guidance for implementing and planning requirements of the Water Resources Council's Principles and Standards (P&S) and related policies. It does so by describing the planning process under which alternative plans are prepared and evaluated and by identifying the changes from existing guidance that are necessary as a result of the P&S and related policies. The objective of this regulation is to guide planning for the conservation, development, and management of water and related land resources. This is accomplished by systematically preparing and evaluating alternative plans that address publicly identified problems, needs, concerns and opportunities. Alternative plans will consider nonstructural and structural measures as coequal approaches to managing resources. Through this process, decision makers at all levels will be provided information necessary to make effective choices regarding resource management under existing and projected conditions.

#### I. CONSTRAINTS AND CONTROLS

19. GENERAL - To date, this study has been funded to complete a Plan of Study and initiate preliminary planning. Based on scheduled funding, it is estimated that the survey report will be completed in FY 1979. Studies will be continued only so long as a possibility remains that a workable, economically feasible, and environmentally and socially acceptable plan of improvement can be recommended.

#### J. COORDINATION

20. LOCAL COORDINATION - Past coordination with local and State interests aided in reconnaissance of the area and in arranging for the public meeting held in May 1976. Coordination measures are continuing through conference and correspondence. Each stage of the study will be presented for comment or concurrence by other Federal, State, regional, local and civic agencies having an interest in planning or development of water resources in the study area. Further coordination is accruing through continued use of a public information program.

The New England Division, Corps of Engineers, will be responsible for the coordination and management of the Rippowam River Basin Study.

In order to insure Federal, State and local participation in the Rippowam River Basin Study, the following organizations will be requested to coordinate in the water resource planning of the basin:

a. Federal Agencies

U.S. Department of Interior, Fish & Wildlife Service  
U.S. Department of Agriculture, Soil Conservation Service  
U.S. Environmental Protection Agency  
U.S. Department of Interior, Bureau of Outdoor Recreation  
U.S. Department of Transportation, Federal Highway Administration  
U.S. Department of Housing and Urban Development  
U.S. Federal Insurance Administration  
U.S. Department of Health, Education & Welfare  
U.S. Advisory Council on Historic Preservation

b. State and Regional Agencies

New York Department of Environmental Conservation  
Connecticut Department of Environmental Protection  
Connecticut Planning Council  
Connecticut Office of Intergovernmental Programs, State Clearinghouse  
Connecticut Development Commission  
Tri-State Regional Planning Commission

c. Local Interests

Stamford Planning Board  
Stamford Environmental Protection Board  
Stamford Water Company

In addition, we will be in contact with various civic groups and neighborhood associations, as well as elected officials or their representatives of the communities within the Rippowam River Basin.

The above listed agencies were informed of the 24 May 1976 initial public meeting for the Rippowam River Basin Study.

K. PUBLIC PARTICIPATION

21. GENERAL - The initial public meeting in May 1976 accomplished much in an educational sense, explaining the nature of the proposed study and allowing public officials and the general public freedom of expression in presenting their views. Further coordination will be established with all required Federal, State and local agencies. Regional planning and conservation associations will be involved in the planning process through utilization of workshop-type meetings. Regular progress meetings will be held to receive local input into the study, and to inform agencies of progress during the course of the study. The public participation program will be kept flexible and responsive to needs of all concerned local officials, private agencies and individual interests. In addition to the initial public meeting, two more formal public meetings will also be conducted, one during the formulation stage of the study, and another at the conclusion of the study.

Formulation stage meetings will be held in the course of report preparation in order to present the advantages and disadvantages of all alternative solutions developed and to incorporate public views and desires in selection of alternatives and plan formulation. Late stage public meetings will be held before report completion to present the findings of detailed studies, including the rationale for any proposed solution, and the tentative recommendations.

#### L. SUBMISSION OF REPORTS

22. PLAN OF STUDY - This report constitutes the Plan of Study.
23. FINAL FEASIBILITY REPORT - The submission of the feasibility report will be determined by the allocation of funds made available as discussed in Section I, "Constraints and Controls." The final report is currently scheduled to be submitted to the Office of the Chief of Engineers in September 1979.
24. OTHER REPORTS - Interim reports and Environmental Impact Statements will be submitted during the course of investigations, if necessary.

#### M. ESTIMATES OF COSTS

25. GENERAL - The preparation of budgetary data for the Rippowam River Basin Survey is predicated upon the estimated amount of money needed to complete the work items considered necessary for a Level C study. The total estimated funds required to complete the Rippowam River Basin study are \$420,000. The distribution of funds will provide for the identification of the needs of each area under investigation by FY 1977, with the completion of alternative solutions by FY 1978, and the selection of the final alternatives in FY 1978 and 1979.

#### N. RECOMMENDATION

26. RECOMMENDATION - Approval of this Plan of Study on investigating the water resources for the Rippowam River Basin is recommended.

ATTACHMENT 1

RIPPOWAM RIVER BASIN STUDY  
SUMMARY OF 24 MAY 1976 PUBLIC MEETING  
STAMFORD, CONNECTICUT

Colonel John H. Mason, Division Engineer --

The goals of the Study are the "determination of foreseeable short and long term water and related land resource needs in the basin, the formulation of a management plan to provide for the best use or combination of uses for the resources of the basin to meet these needs, and the recommendation of projects and programs within the basin."

William Swaine, Plan Formulation Branch --

The following are some of the basin problems as we know them and which represent the types of items that will be included in the basin study:

- 1) "Floods may be expected to occur on the Rippowam River during any season of the year. Early spring rains, combined with melting snow, will cause spring type floods such as during May 1936 and March 1953. Heavy rains during the summer and fall months, particularly those associated with hurricanes, have resulted in major floods such as September 1938, August 1954, October 1955, June 1972 and as recently as September 1975."
- 2) "Although extensive flood control measures, such as dams and local protection works, have been constructed to protect properties in the larger New England river basins such as the Connecticut and Naugatuck, the smaller basins have not been evaluated for their future flood potential. This is what we will attempt to do in the Rippowam River Basin."
- 3) "When discussing flood control measures, there are only a limited number of structural measures that can be taken. These methods would include dams and reservoirs at sites upstream of the problem areas, channel excavation, walls and dikes or surface or subsurface diversions. So called nonstructural techniques for reducing future flood damage will also be investigated during our study. These methods include floodproofing of existing buildings, enforcement of zoning ordinances, prohibiting new construction in the floodplain and obtaining Federally subsidized flood insurance. All of these alternatives will be evaluated initially in order to determine a future course of action for flood control in the Rippowam River Basin."

John Taintor, Representing Senator Lowell Weicker --

No particular statement made but indicated that Senator WEicker has a great deal of interest in the study.

Sally Bolster, Representing Congressman Stewart McKinney --

Previous flooding has been very costly and we hope the Corps of Engineers will be able to provide specific recommendations for flood control.

Margaret Weiss, Resident of Stamford --

She states that last September, "The river came up almost over the banks. We live very close to the river, about 15 feet, and our property is eroded underneath like a cave, and big boulders are hanging loose and roots of trees."

Lorraine Parker, President of Toilsome Brook Association --

She indicated that man should stop building along the floodplains.

Jon A. Smith, City Planning and Zoning Director --

Understand that the proposed study has a two point objective: (1) Management plan for land use resource needs and (2) Recreation. He suggests if solutions for flooding problems include any formal channelization of the river such as exists between Broad Street and Main Street, then you ought to think in terms of how that might work in concert with the development of a riverside park for the inner city residents of the city.

Erwin Steinburg, Resident of Stamford --

He stated that "The river has filled up with gravel. I do not recall that within the last 15 years it has been dredged. There was some activity after the flood in 1955 to do a yearly cleaning up of the river. This has not been done, and the river has been filled in several areas. A cleaning out at the present time is a must. There are several bridges on North Street. There is one on Coldspring Road and others that have to be replaced." The study and subsequent action are urgently required.

John Colasso, President of the Riverbend Association --

"We feel that this river in this particular area from Bridge Street to the Coldspring Road bridge should be properly dredged. We also feel to stop erosion in that area, you should build either retaining walls along that portion of the river or riprap."

Martha Huntley, Chairman of the Rippowam Protection Committee --

She stated that health and safety are her first thoughts in flood crisis. She had many questions based upon building on a floodplain, if building a new bridge would help the flooding, if the flow of the river has changed, if any more dredging would harm the fishing, what can be done to floodproof existing houses, and other related questions.

Henry Friedlander, Resident of Stamford --

He stated that, "I would just like you to study the recreational aspects in North Stamford, North of the Parkway, as well as the flooding down here in Central Stamford."

Colonel Mason, Division Engineer (NED) --

"Our study will deal primarily but not exclusively with flood control in the basin. Consideration will also be given to navigation, water supply, water quality control, recreation and the low flow augmentation and any other allied water use which deserves attention."

Ralph Layman, Resident of Stamford --

"I think that what the Army Engineers should limit themselves to is dredging the river and taking that oxbow around Severance Drive and putting corrugated sheeting in the water and making that riverbed much more capable to carry the water."

Tessa Byck, Resident of Stamford --

She states that, "The fluctuations of the river have increased fantastically in the last two years," and also her concern of the pollution problem in the river.



Barry Escott, Vice President of the Toilsome Brook Association --

"I did find a problem that I stumbled upon one time driving up Washington Boulevard during a storm. The Rippowam River was covering the outlet of Toilsome Brook going into the Rippowam River. The Rippowam River was above it thus slowing the flow of the waters coming out."

Edward Connell, Resident of Stamford --

He recalls the disastrous floods of March 1936 and October 1955 when he had to evacuate his home. The water was about two feet above his first floor and when he returned three weeks later he had to remove muck and silt from his home. He suggests that the Corps recommend steps to strengthen the legal authority of the Stamford Environmental Protection Board.

Robert Foshay, Resident of Stamford, Castlewood Park Homeowners Assn --

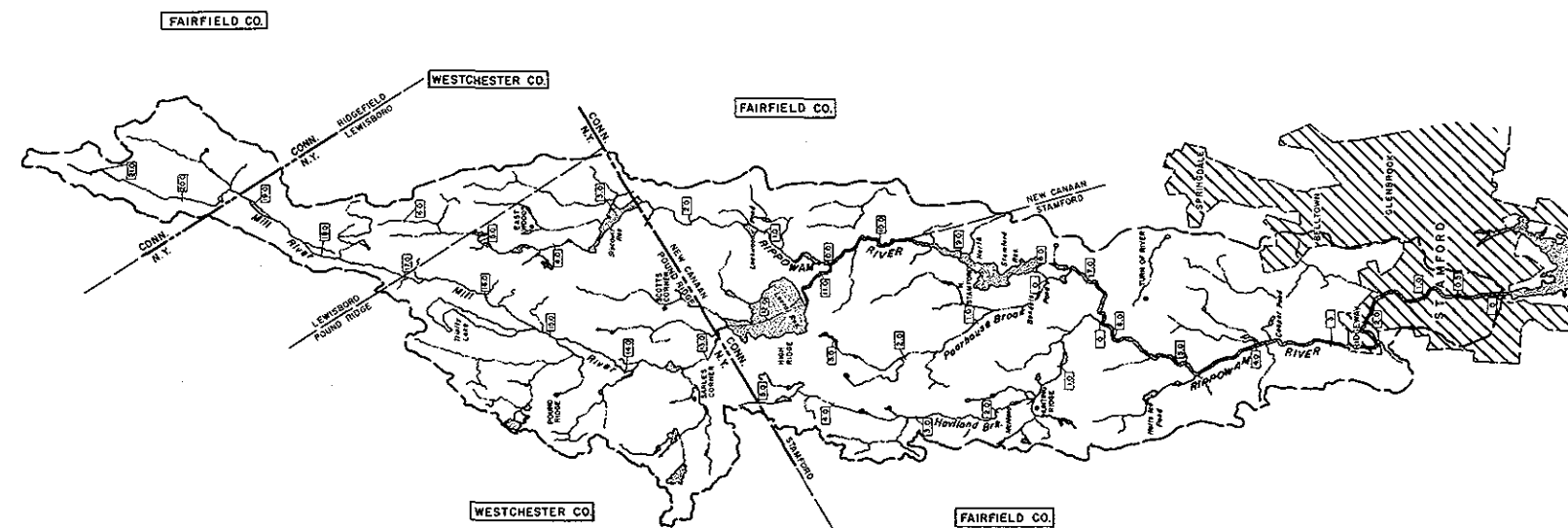
He states that during the flood of June 1972, two houses were damaged by floodwaters undermining slab foundations. Sanitary facilities were unusable in many homes. The city has allowed degeneration of the basin to take place. Man-made changes have worsened the flood problem.

Booth Hemingway, President, Stamford Land Conservation Trust --

He has compiled an inventory of current and proposed open space and he feels that "open space, water supply, water purity and flood control are irrevocably intertwined." He does not want to "waste time" on a study and stated that the study funds should be used to buy upstream property development rights.

Dennis White, Conservationist of Stamford, Inc. --

Reaction to the news of the study is mixed. On one hand the flood problem has put a serious strain on the landowners but on the other hand, the conservationists are concerned that a flood control project will disrupt the river. The cause of the Rippowam River flood problem is simply continued encroachment on the streambed and the continued filling of wetlands.

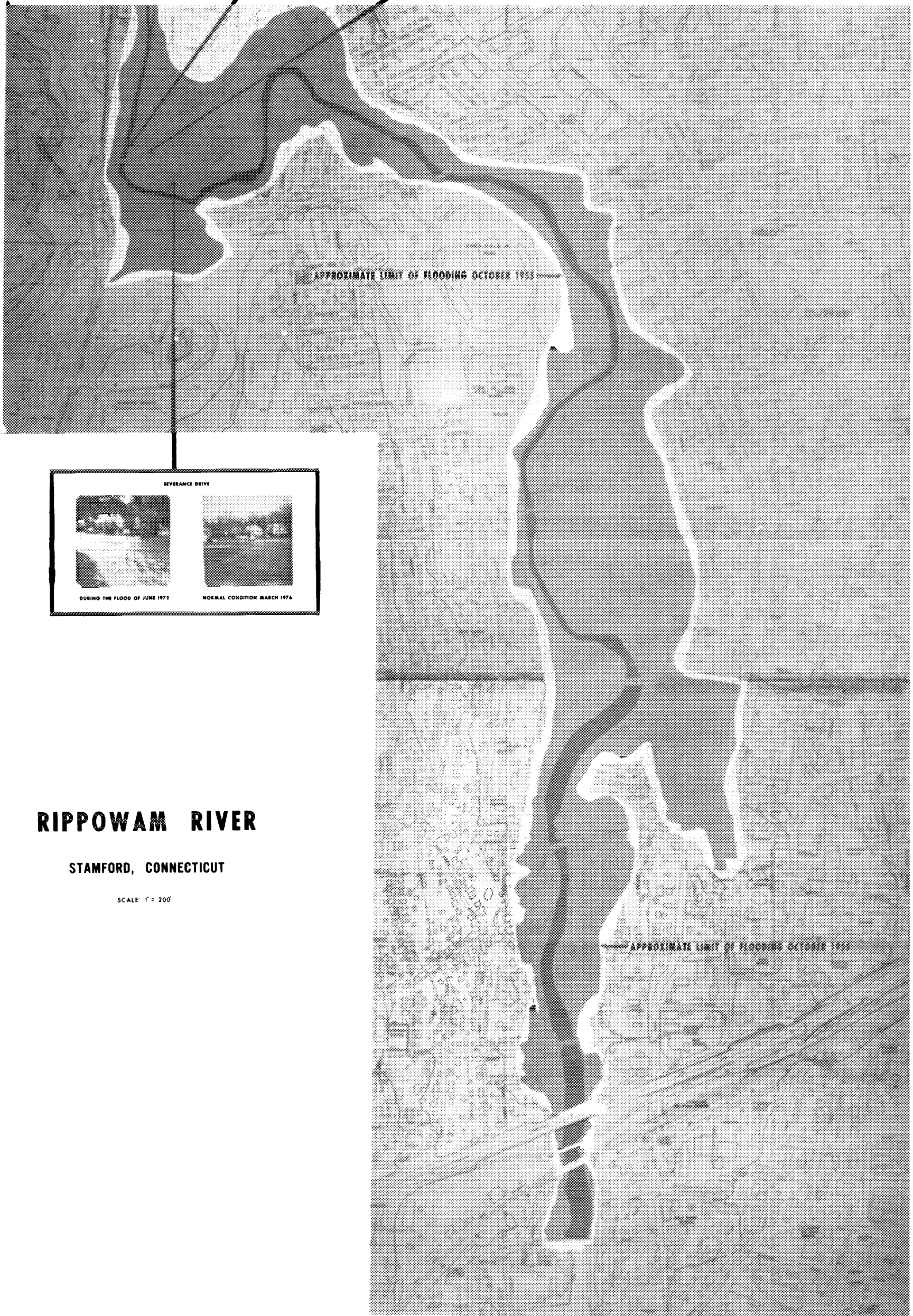
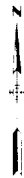
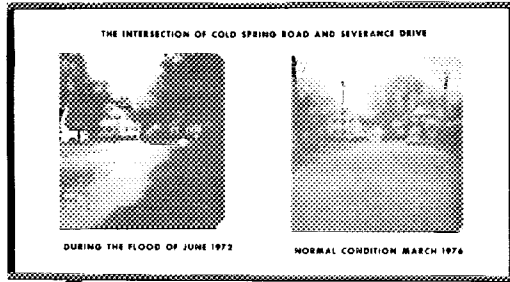
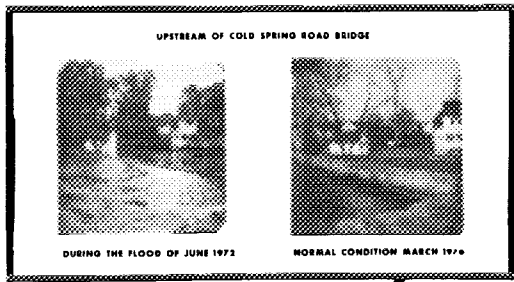


**PLAN**  
SCALE IN FEET  
0 1000 2000 3000 4000

INDICATES RIVER MILE

STAMFORD STAMFORD URBAN AREA

[illegible]



# RIPPOWAM RIVER

STAMFORD, CONNECTICUT

SCALE: 1" = 200'

WATER RESOURCES INVESTIGATION

RIPPOWAM RIVER BASIN  
CONNECTICUT AND NEW YORK

ATTACHMENT TO PLAN OF STUDY

SCHEDULE OF WORK AND BUDGETARY DATA

SEPTEMBER 1976

REFERENCE ER11-2-101, WHICH STATES THAT: BUDGETARY INFORMATION  
IS NOT TO BE RELEASED OUTSIDE THE DEPARTMENT OF THE ARMY.

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## EXHIBITS

<u>Number</u>	<u>Subject</u>
1	STUDY COST ESTIMATE (PB-6)
2	STUDY COST ESTIMATE (FY STAGES)
3	STUDY ACTIVITIES
4	MILESTONES

## ATTACHMENT

1. GENERAL. - The Rippowam River Basin study, a Level C feasibility study of survey scope, will research the following needs and potential problems in the basin: flood control, improvement of water quality, development of recreational and fish and wildlife potential, navigation, water supply and related purposes. Whereas the initial Public Meeting, held on 24 May 1976, disclosed that flood control was the major concern of residents and local officials, early emphasis will be placed on developing alternate plans of structural and nonstructural improvements for flood control.

Estimates of cost for each major element of the study are shown in Exhibit 1. A breakdown of anticipated funding for these elements by Fiscal Year is shown in Exhibit 2. Exhibit 3 delineates the various items of work within each major element, while Exhibit 4 presents a graphic description of anticipated expenditures, checkpoint dates and milestone dates.

2. CONSTRAINTS AND CONTROLS. - The following controls will be utilized throughout the study period:

a. Initial funds of \$30,000 were provided for Fiscal Year 1976 work, including field investigations, meetings with local officials and the initial Public Meeting. Of the Fiscal Year 1976 allowance, \$4,000 was transferred to other projects (Teletype 26 March 1976) and \$10,000 was a carry-over to Fiscal Year 1976T. Additional funding of \$10,000 has been made available for Fiscal Year 1976T to complete Stage I planning and initiate hydrologic and economic studies and inventories. In addition, Federal, State and local agencies will be contacted to obtain information on existing prior studies for the Rippowam River Basin.

b. In Fiscal Year 1977, \$100,000 will be required to continue development of alternate plans for flood control and related water and land resources. Environmental and archeological studies will be initiated and engineering plans will be formulated including project costs and economic justification. In Fiscal Year 1978, \$175,000 will be required to continue the public involvement program, including a public meeting and to perform foundation and material investigations and real estate studies where necessary. A system of accounts for the multi-objective framework will be prepared during this stage. During Fiscal Year 1979, if final iterations determine a justified plan of protection, \$105,000 will be required to make the final studies of the recommended plan and complete the report. All alternatives relating to the accomplishment of the study objectives will be evaluated and presented at the Stage II Checkpoint Conference. If no plans of improvement are feasible a negative report will be prepared. Economically justified plans of

protection will be subjected to a more detailed investigation and the results presented at the Stage III Checkpoint Conference.

c. All items of the study will be in accordance with the regulations of the Corps of Engineers. Special attention will be given to studies concerning the degree of protection, net maximization of benefits, and environmental enhancement.

3. PREPARATION OF REPORTS. - The Plan of Study contains the specifications for the investigation and methods to be used, physical work to be accomplished, precision and accuracy required, schedules to be met, and coordination to be effected. A draft feasibility report, to be prepared in advance of the Stage III Checkpoint conference, will contain the conclusions reached after completion of the following items of work:

Hydrologic design related to individual projects,

Individual project surveys

Foundations and materials investigations

Stream regulation studies

Design and cost estimates

Benefit to cost analysis

Real estate studies

Effects assessment and environmental analysis

Results of other agency findings

Description of the selected plan

Conclusions

A statement of a method for completing the study

The final report will be prepared and submitted to OCE after the Stage III public meeting is held. Submission of the report is scheduled for September 1979.

Study Cost Estimate (PB-6)  
(ER 11-2-220)

Appropriation Title: General Investigations  
Category: Surveys  
Class: Flood Control Study

Name of Study: Rippowam River  
Location: Stamford, Ct.

SUBFEATURE

CURRENT FEDERAL COST ESTIMATE

Number	Title	Feature			Feature Total	Previous Federal Total Cost Estimate and Date Approved (1 July 1976)	Remarks
		Stage 1	Stage 2	Stage 3			
.01	Public Involvement	15,000	12,000	12,000	39,000	39,000	
.02	Institutional Studies	0	0	5,000	5,000	5,000	
.03	Social Studies	3,000	3,000	4,000	10,000	10,000	
.04	Archeological Studies	0	5,000	0	5,000	5,000	
.05	Environmental Studies	5,000	25,000	13,000	43,000	43,000	Includes recreation report
.06	Economic Studies	1,000	10,000	1,000	12,000	12,000	
.07	Surveying & Mapping	0	10,000	2,000	12,000	12,000	
.08	Hydrology & Hydraulics Investigations	0	34,000	22,000	56,000	56,000	
.09	Foundations & Materials Investigations	0	15,000	4,000	19,000	19,000	
.10	Design & Cost Estimates	0	52,000	28,000	80,000	80,000	
.11	Real Estate Studies	0	15,000	4,000	19,000	19,000	
.12	Study Management	2,000	5,000	3,000	10,000	10,000	
.13	Plan Formulation	5,000	10,000	3,000	18,000	18,000	
.14	Report Preparation	1,000	1,000	1,000	3,000	3,000	
.20	Other Studies						
.30	S&A	8,000	53,000	28,000	89,000	89,000	
	TOTAL	40,000	250,000	130,000	420,000	420,000	

Division: New England

Region: New England



PLAN OF STUDY  
RIPPOWAM RIVER BASIN  
STUDY COST ESTIMATE

Cost Classification	Feature	Current Cost Estimate	STAGE I		STAGE II		STAGE III
			FY 1976	FY 1976T	FY 1977	FY 1978	FY 1979
.01	Public Involvement	39,000	12,000	3,000	4,000	8,000	12,000
.02	Institutional Studies	5,000	0	0	0	0	5,000
.03	Social Studies	10,000	3,000	0	0	3,000	4,000
.04	Archeological Studies	5,000	0	0	0	5,000	0
.05	Environmental Studies	43,000	4,000	1,000	10,000	15,000	13,000
.06	Economic Studies	12,000	0	1,000	8,000	2,000	1,000
.07	Surveying & Mapping	12,000	0	0	3,000	7,000	2,000
.08	Hydrology & Hydraulics	56,000	0	0	18,000	16,000	22,000
.09	Foundations & Materials	19,000	0	0	5,000	10,000	4,000
.10	Design & Cost Estimates	80,000	0	0	18,000	34,000	28,000
.11	Real Estate Studies	19,000	0	0	5,000	10,000	4,000
.12	Study Management	10,000	1,000	1,000	2,000	3,000	3,000
.13	Plan Formulation	18,000	4,000	1,000	6,000	4,000	3,000
.14	Report Preparation	3,000	0	1,000	0	1,000	1,000
.20	Other Studies	-----					
.30	Supervision & Administration	89,000	6,000	2,000	21,000	32,000	28,000
TOTAL		420,000	30,000	10,000	100,000	150,000	130,000

PLAN OF STUDY  
RIPPOWAM RIVER BASIN  
STUDY ACTIVITIES

<u>Cost</u> <u>Class.</u>	<u>Feature</u>
.01	PUBLIC INVOLVEMENT  Establish Coordination Preliminary Identification of Problems & Needs Public Contact & Information Bulletins Arrangement for Initial Public Meeting Initial Public Meeting Arrangement for Formulation Public Meeting Formulation Public Meeting Arrangements for Late Stage Public Meeting Late Stage Public Meeting Review of Impact Reports by Other Agencies
.02	INSTITUTIONAL STUDIES  Analysis of Existing Institutional Framework Assessment of Ways and Means to Implement the Recommended Plan
.03	SOCIAL STUDIES  Attitude Survey of Local Residents Regarding Preliminary Alternatives Cultural and Historic Studies Survey of Population Characteristics Housing Studies Health Studies Recreation and Leisure Studies Studies of Community Cohesion
.04	ARCHEOLOGICAL STUDIES
.05	ENVIRONMENTAL STUDIES  Inventory of Baseline Environmental Resources Preliminary Effects Assessment & Environmental Study & Analysis

Effects Assessment and Environmental Analysis  
Fish and Wildlife Studies  
Enhancement and Mitigation Studies  
Recreation Studies  
Environmental Report  
Effects Assessment Report  
Preliminary Environmental Impact Statement  
Statement of Findings

.06

#### ECONOMIC STUDIES

Preliminary Economic Base Study  
Employment and Labor Force Study  
Land Use Study  
Business and Industrial Development Survey  
Population Projections and Other Demographic  
Studies  
Flood Damage Surveys  
Benefit/Cost Analysis  
Economic Report

.07

#### SURVEYING AND MAPPING

Preliminary Surveys  
Stream Channel Cross-Sections and Flood Profiles  
Aerial Topographics

.08

#### HYDROLOGY AND HYDRAULICS INVESTIGATIONS

Determination of Water Resource Capability and  
Generalized Hydrologic Relations  
Preliminary Hydrologic Design and Field  
Reconnaissance  
Hydrologic and Hydraulic Design  
Hydrology and Hydraulics Report

.09

#### FOUNDATIONS AND MATERIALS

Field Reconnaissance, Preliminary Site Selections,  
F and M Investigations  
F and M Report

.10

#### DESIGN AND COST ESTIMATES

Field Reconnaissance, Preliminary Site Selections,  
Design  
Preliminary Design and Cost Estimates  
Design and Cost Estimates  
Design and Cost Estimate Report

- .11 REAL ESTATE STUDIES
  - Preliminary Real Estate Studies
  - Real Estate Report
- .12 STUDY MANAGEMENT
  - Cost Apportionment, Scheduling and Other Management Functions
  - Checkpoint Meetings and Preparation
- .13 PLAN FORMULATION
  - Problems and Needs Development
  - Alternative Development
  - Formulation Studies
  - Public Involvement Strategies
  - Impact Assessments and Evaluation
- .14 REPORT PREPARATION
  - Preparation of Draft of Main Report
  - Prepare and Reproduce Main Report
- .20 OTHER STUDIES
- .30 SUPERVISION AND ADMINISTRATION
  - Draft Review
  - S and A

PLAN OF STUDY  
RIPPOWAM RIVER BASIN  
MILESTONES

<u>No.</u>	<u>Feature</u>	<u>Date</u>
01	Study Initiation Stage I - Public Meeting	February 1976 24 May 1976
02	Approval of Plan of Study	October 1976
03	Stage II Checkpoint Conference	November 1977
04	2nd Stage II Checkpoint Conference (Optional)	February 1978
05	Stage II Public Meeting	April 1978
06	Submit Draft Report and EIS	February 1979
07	Stage III Checkpoint Conference	April 1979
08	Stage III Public Meeting	June 1979
09	Submit Final Report	September 1979
10	Public Notice	December 1979